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FLOOD INSURANCE STUDY

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BOROUGH OF ENGLISHTOWN, NEW JERSEY
MONMOUTH COUNTY

SEPTEMBER 16, 1980

federal emergency management agency
federal insurance administration

COMMUNITY NUMBER - 340294

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PUBLISHED SEPARATELY:

Flood Insurance Rate Map

FLOOD INSURANCE STUDY
BOROUGH OF ENGLISHTOWN, NEW JERSEY

1.0 INTRODUCTION

1.1 Purpose of Study

This Flood Insurance Study investigates the existence and severity of flood hazards in the Borough of Englishtown, Monmouth County, New Jersey, and aids in the administration of the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973. This study will be used to convert Englishtown to the regular program of flood insurance by the Federal Insurance Administration (FIA). Local and regional planners will use this study in their efforts to promote sound flood plain management.

In some states or communities, flood plain management criteria or regulations may exist that are more restrictive or comprehensive than those on which these federally-supported studies are based. These criteria take precedence over the minimum federal criteria for purposes of regulating development in the flood plain, as set forth in the Code of Federal Regulations at 44 CFR, 60.3. In such cases, however, it shall be understood that the state (or other jurisdictional agency) shall be able to explain these requirements and criteria.

1.2 Authority and Acknowledgements

The source of authority for this Flood Insurance Study is the National Flood Insurance Act of 1968 and the Flood Disaster Protection Act of 1973.

The hydrologic and hydraulic analyses in this study represent a revision of the original analyses by the New Jersey Department of Environmental Protection for the Federal Insurance Administration under Contract No. H-3959. This work was completed in December 1979. The hydrologic and hydraulic analyses for this study were conducted by Justin and Courtney, Inc. under subcontract to the New Jersey Department of Environmental Protection.

1.3 Coordination

A search for basic data was made at all levels of government and local sources.

The identification of streams requiring detailed study was completed in an initial Consultation and Coordination Officer's (CCO) meeting attended by representatives from the New Jersey Department of Environmental Protection, the FIA, and the Borough of Englishtown on March 15, 1976.

On April 29, 1980, the results of the study were presented at a final CCO meeting attended by representatives of the FIA, the New Jersey Department of Environmental Protection, Justin and Courtney, Inc., and the Borough of Englishtown.

2.0 AREA STUDIED

2.1 Scope of Study

This Flood Insurance Study covers the incorporated area of the Borough of Englishtown, Monmouth County, New Jersey. The area of study is shown on the Vicinity Map (Figure 1).

McGellairds Brook, Weamaconk Creek and Tributary to Weamaconk Creek in other sources were studied by detailed methods. The areas studied by detailed methods were selected with priority given to all known flood hazard areas and areas of projected development and proposed construction for the next five years, through December 1984.

2.2 Community Description

The Borough of Englishtown is located in Monmouth County in central New Jersey. The population estimate of 1,084 has remained unchanged since the 1970 census.

The borough is a commercial and business center for the surrounding agricultural area. There are several large residential developments, however, they are located in the nearby Township of Manalapan. Englishtown is completely surrounded by the Township of Manalapan, which is largely agricultural.

Commercial and residential areas are located predominately between McGellairds Brook and Weamaconk Creek on the flat flood plain at elevations less than 15 feet above the normal stream level. There is little new development within the borough. Most new development in the area is taking place within the surrounding township.

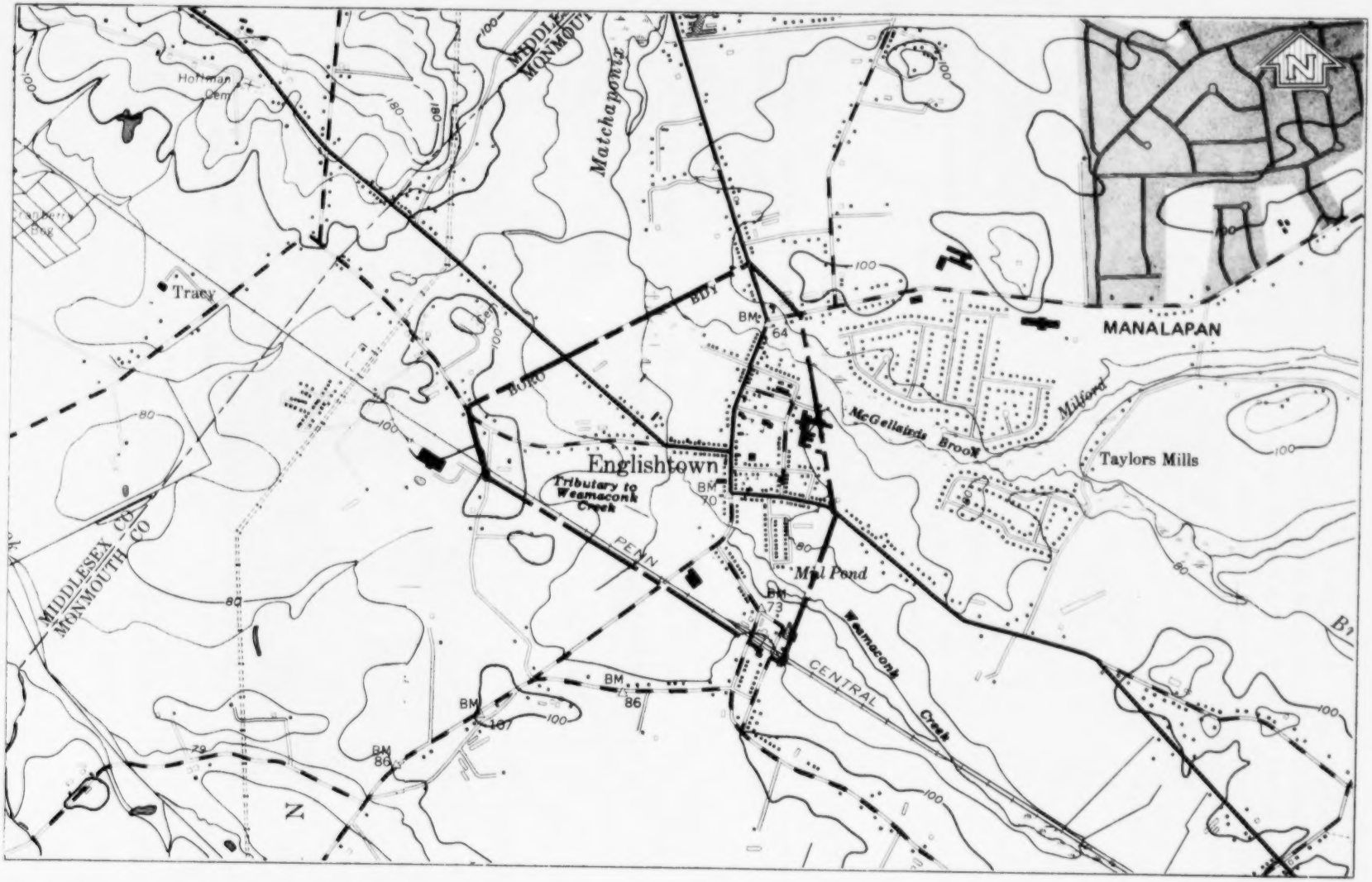


FIGURE 1

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BOROUGH OF ENGLISHTOWN, NJ
(MONMOUTH CO.)

APPROXIMATE SCALE
2000 0 2000 4000 6000 FEET

VICINITY MAP

Englishtown has a continental climate, due primarily to prevailing westerly winds. Average annual temperature is about 53 degrees Fahrenheit (°F), with annual extremes normally varying from approximately 5°F to 95°F. The normal annual precipitation is approximately 38 inches. Most storms come from the west, but some coastal storms move in from the east.

2.3 Principal Flood Problems

According to local information, there have been no major flooding problems in the Borough of Englishtown in the 60 years prior to this study. Data from gaging station No. 0140300 with 11 years of record indicated flooding on Matchaponix Brook more than 10 miles downstream of the community, but there is no record of flooding in the community. Figures 2 and 3 show the estimated 100- and 500-year flood elevations on two of the principal stream crossings in the community.

2.4 Flood Protection Measures

There are no existing or proposed flood protection structures within the community. Lake Weamaconk can provide a limited amount of storage.

In an effort to minimize flood damages, the Division of Water Resources of New Jersey Department of Environmental Protection has adopted rules, regulations, and minimum standards concerning development and use of land within the floodway.

3.0 ENGINEERING METHODS

For the flooding sources studied in detail in the community, standard hydrologic and hydraulic study methods were used to determine the flood hazard data for this study. Flood events of a magnitude which are expected to be equalled or exceeded once on the average during any 10-, 50-, 100-, or 500-year period (recurrence interval) have been selected as having special significance for flood plain management and for flood insurance premium rates. These events, commonly termed the 10-, 50-, 100-, and 500-year floods, have a 10-, 2-, 1-, and 0.2-percent chance, respectively, of being equalled or exceeded during any year. Although the recurrence interval represents the long-term average period between floods of a specific

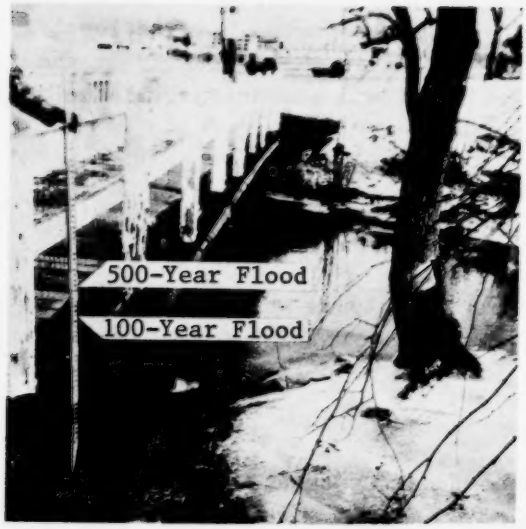


Figure 2 - Estimated 100- and 500-year flood elevations on McGellairds Brook upstream of North Main Street.

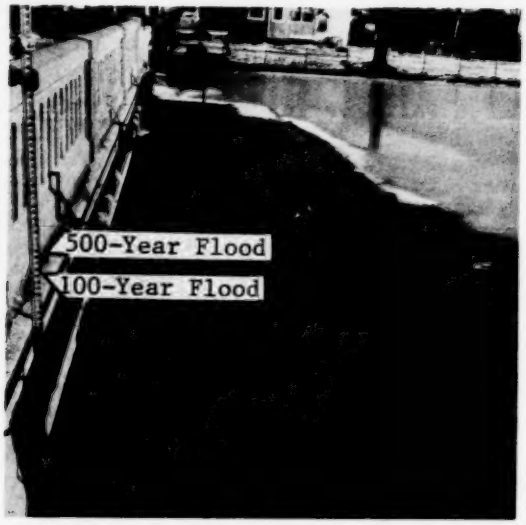


Figure 3 - Estimated 100- and 500-year flood elevations on Weamaconk Creek at South Main Street above Mill Pond Dam.

magnitude, rare floods could occur at short intervals or even within the same year. The risk of experiencing a rare flood increases when periods greater than one year are considered. For example, the risk of having a flood which equals or exceeds the 100-year flood (one-percent chance of annual occurrence) in any 50-year period is about 40 percent (four in ten) and, for any 90-year period, the risk increases to about 60 percent (six in ten). The analyses reported here reflect flooding potentials based on conditions existing in the community at the time of completion of this study. Maps and flood elevations will be amended periodically to reflect future changes.

3.1 Hydrologic Analyses

Hydrologic analyses were carried out to establish the peak discharge-frequency relationships for floods of the selected recurrence intervals for each flooding source studied in detail affecting the community.

For Weamaconk Creek and McGellairds Brook, the hydrologic analyses were based on the method for estimating flood-peak magnitudes shown in Special Report 38 (Reference 1). This method is based on a multiple regression analysis which is used to develop mathematical relationships between flood discharges at the various recurrence intervals obtained from gaging station data and the hydrologic characteristics. Flood information from 103 sites was used in making the analysis. Hydrologic parameters included stream drainage area, main channel slope, surface storage area, and an index of man-made impervious cover based upon basin population and development conditions. The 500-year discharge value was extrapolated from the lower frequency floods.

Tributary to Weamaconk Creek in other sources has a drainage area less than 1 square mile, so the rational method was used to determine the discharges. The rational method is a method of obtaining flood flows using the watershed area, a coefficient of runoff based on surface conditions within the watershed, and the intensity of rainfall based on time of concentration. Varying values of the runoff coefficient were used for different flood frequencies as suggested in the modified rational method of estimating flood flows (Reference 2).

A summary of drainage area-peak discharge relationships for the streams studied by detailed methods is shown in Table 1, "Summary of Discharges."

TABLE 1 - SUMMARY OF DISCHARGES

FLOODING SOURCE AND LOCATION	DRAINAGE AREA (sq. miles)	PEAK DISCHARGES (cfs) 10-YEAR	50-YEAR	100-YEAR	500-YEAR
McGELLAIRDS BROOK					
At downstream corporate limits	14.99	760	1,240	1,510	2,490
WEAMACONK CREEK					
At downstream corporate limits	7.66	410	650	790	1,360
TRIBUTARY TO WEAMACONK CREEK					
At the confluence with Weamaconk Creek	0.34	120	185	220	320
At upstream corporate limits	0.19	90	135	160	215

3.2 Hydraulic Analyses

Analyses of the hydraulic characteristics of the flooding sources studied in detail were carried out to provide estimates of the elevations of floods of the selected recurrence intervals along each of these flooding sources.

Water-surface elevations of floods of the selected recurrence intervals were computed through use of the U. S. Army Corps of Engineers (COE) HEC-2 step-backwater computer program (Reference 3). Starting water-surface elevations for McGellairds Brook and Weamaconk Creek were obtained from the Flood Insurance Study for the Township of Manalapan (Reference 4). Starting water-surface elevations for Tributary to Weamaconk Creek in other sources were based on the compiled elevations at the point of confluence with Weamaconk Creek.

Overbank cross-section data for streams were obtained from aerial photographs. The below-water sections were obtained by field measurement. All bridges and culverts were surveyed to obtain elevation data and structural geometry. Cross sections were located at close intervals above and below bridges and culverts in order to compute the backwater effects of these structures.

Channel roughness factors (Manning's "n") were assigned on the basis of field inspection of the flood plain areas. The roughness

coefficient for the channel of McGellairds Brook ranged from 0.030 to 0.080 and from 0.040 to 0.10 for the overbanks. On Weamaconk Creek the roughness coefficient was 0.045 for the channel and ranged from 0.045 to 1.20 for the overbank. For Tributary to Weamaconk Creek, the roughness coefficient ranged from 0.013 to 0.035 for the channel and was 0.060 for the overbanks.

Flood profiles were drawn showing computed water-surface elevations to an accuracy of 0.5 foot for floods of the selected recurrence intervals. Locations of selected cross sections used in the hydraulic analyses are shown on the Flood Profiles (Exhibit 1). For stream segments for which a floodway is computed (Section 4.2), selected cross-section locations are also shown on the Flood Boundary and Floodway Map (Exhibit 2).

All elevations used in this study are referenced to the National Geodetic Vertical Datum of 1929 (NGVD), formerly referred to as Sea Level Datum of 1929. Locations of the elevation reference marks used in the study are shown on the maps.

The hydraulic analyses for this study are based on the effects of unobstructed flow. The flood elevations shown on the profiles are valid only if hydraulic structures remain unobstructed and do not fail.

4.0 FLOOD PLAIN MANAGEMENT APPLICATIONS

The National Flood Insurance Program encourages state and local governments to adopt sound flood plain management programs. Therefore, each Flood Insurance Study includes a flood boundary map designed to assist communities in developing sound flood plain management measures.

4.1 Flood Boundaries

In order to provide a national standard without regional discrimination, the 100-year flood has been adopted by the FIA as the base flood for purposes of flood plain management measures. The 500-year flood is employed to indicate additional areas of flood risk in the community. For each stream studied in detail, the boundaries of the 100- and 500-year floods have been delineated using the flood elevations determined at each cross section; between cross sections, the boundaries were interpolated using topographic maps at a scale of 1:200 with a contour interval of 5 feet (Reference 5). In cases

where the 100- and 500-year flood boundaries are close together, only the 100-year boundary has been shown.

The boundaries of the 100- and 500-year floods are shown on the Flood Boundary and Floodway Map (Exhibit 3). Small areas within the flood boundaries may lie above the flood elevations and, therefore, may not be subject to flooding. Owing to limitations of the map scale and lack of detailed topographic data, such areas are not shown.

4.2 Floodways

Encroachment on flood plains, such as artifical fill, reduces the flood-carrying capacity, increases flood height of streams, and increases flood hazards in areas beyond the encroachment itself. One aspect of flood plain management involves balancing the economic gain from flood plain development against the resulting increase in flood hazard. For purposes of the Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood plain management. Under this concept, the area of the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood plain areas that must be kept free of encroachment in order that the 100-year flood be carried without substantial increases in flood heights. Minimum standards of the FIA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. However, the State of New Jersey has established criteria limiting the increase in flood heights to 0.2 foot. Thus, floodways having no more than 0.2 foot surcharge have been delineated from this study. The floodways in this report are presented to local agencies as minimum standards that can be adopted or that can be used as a basis for additional studies.

Near the mouths of streams studied in detail, floodway computations are made without regard to flood elevations on the receiving water body. Therefore, "With Floodway" elevations presented in Table 2 for certain downstream cross sections of the Tributary to Weamaconk Creek are lower than the regulatory flood elevations in that area, which must take into account the 100-year flooding due to backwater from other sources.

The floodways presented in this study were computed on the basis of equal conveyance reduction from each side of the flood plains. The results of these computations are tabulated at selected cross sections for each stream segment for which a floodway is computed (Table 2).

As shown on the Flood Boundary and Floodway Map (Exhibit 2), the floodway widths were determined at cross sections; between cross sections, the boundaries were interpolated. In cases where the

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
McGellairds Brook								
A	1,375	189	360	4.18	62.2	62.2	62.2	0.0
B	1,660	180	373	4.16	63.1	63.1	63.1	0.0
C	1,730	188	759	2.01	63.7	63.7	63.7	0.0
D	2,575	350	968	1.60	64.2	64.2	64.2	0.0
Weamaconk Creek								
A	570	347	800	0.99	61.6	61.6	61.6	0.0
B	1,055	430	784	1.01	62.2	62.2	62.2	0.0
C	1,670	230	382	2.07	63.5	63.5	63.5	0.0
D	2,035	61	151	5.23	65.0	65.0	65.0	0.0
E	2,130	240	811	0.97	66.0	66.0	66.0	0.0
F	3,130	290	430	1.84	66.3	66.3	66.3	0.0
G	3,570	133	594	1.33	66.6	66.6	66.6	0.0
H	3,690	370	1,994	0.40	72.2	72.2	72.2	0.0
I	3,980	430	1,990	0.40	72.2	72.2	72.2	0.0
J	4,730	239	508	1.60	72.2	72.2	72.2	0.0

[1]Feet above corporate limits

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BOROUGH OF ENGLISHTOWN, NJ
(MONMOUTH CO.)

FLOODWAY DATA

McGELLAIRDS BROOK AND WEAMACONK CREEK

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FT.)	SECTION AREA (SQ. FT.)	MEAN VELOCITY (F.P.S.)	REGULATORY (NGVD)	WITHOUT FLOODWAY (NGVD)	WITH FLOODWAY (NGVD)	INCREASE (FEET)
Tributary to Weamaconk Creek								
A	400	50	36	6.0	66.0	63.7[2]	63.7	0.0
B	730	47	99	2.2	66.0	65.1[2]	65.2	0.1
C	1,080	55	78	2.8	66.0	65.6[2]	65.7	0.1
D	1,504	40	53	4.2	66.9	66.9	66.9	0.0
E	1,604	35	367	0.6	80.7	80.7	80.7	0.0
F	1,719	100	1,087	0.2	80.7	80.7	80.7	0.0

[1] Feet above confluence with Weamaconk Creek
[2] Elevations computed without consideration of backwater effects from Weamaconk Creek

TABLE 2

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

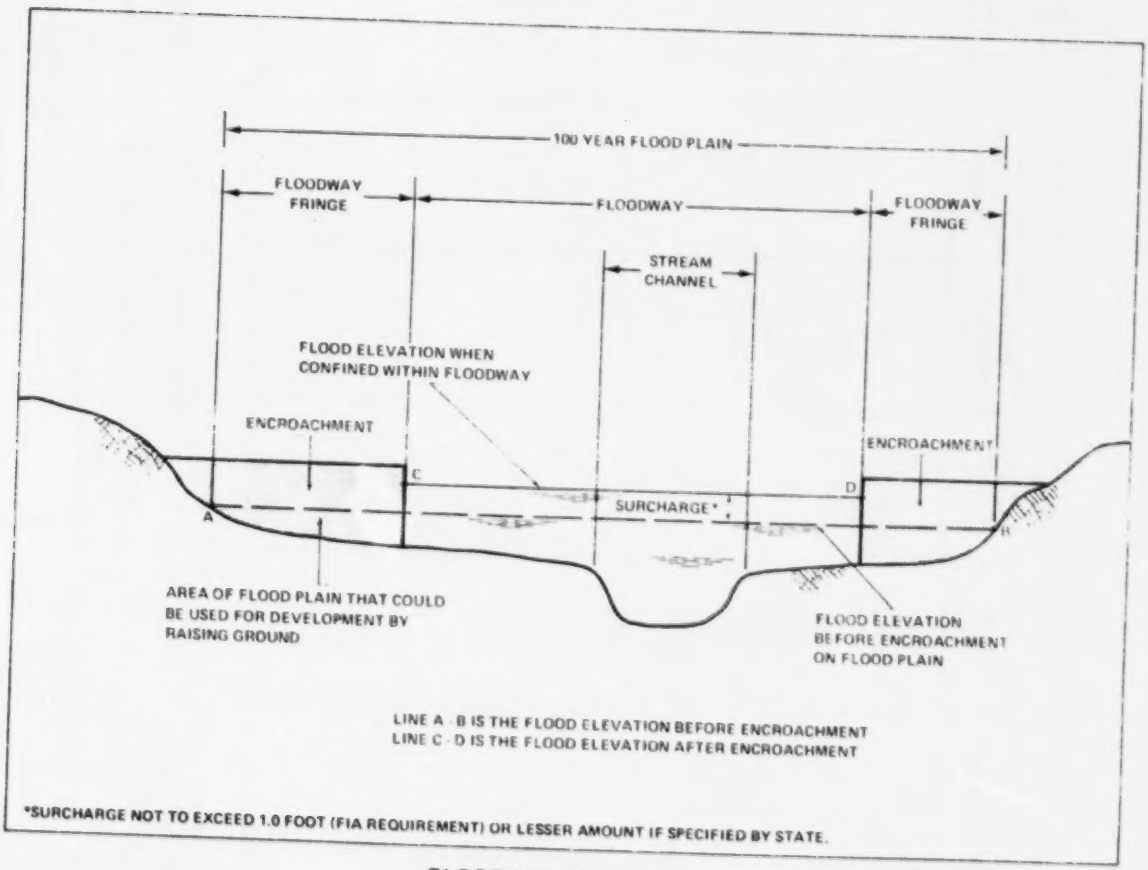
BOROUGH OF ENGLISHTOWN, NJ
(MONMOUTH CO.)

FLOODWAY DATA

TRIBUTARY TO WEAMACONK CREEK

boundaries of the floodway and the 100-year flood are either close together or collinear, only the floodway boundary has been shown.

The area between the floodway and the boundary of the 100-year flood is termed the floodway fringe. The floodway fringe thus encompasses the portion of the flood plain that could be completely obstructed without increasing the water-surface elevation of the 100-year flood by more than 0.2 foot at any point. Typical relationships between the floodway and the floodway fringe and their significance to flood plain development are shown in Figure 4.


100 YEAR FLOOD PLAIN
FLOODWAY FRINGE
FLOODWAY
FLOODWAY FRINGE
STREAM CHANNEL
FLOOD ELEVATION WHEN CONFINED WITHIN FLOODWAY
ENCROACHMENT
ENCROACHMENT
C
D
A
B
SURCHARGE*
AREA OF FLOOD PLAIN THAT COULD BE USED FOR DEVELOPMENT BY RAISING GROUND
FLOOD ELEVATION BEFORE ENCROACHMENT ON FLOOD PLAIN
LINE A - B IS THE FLOOD ELEVATION BEFORE ENCROACHMENT
LINE C - D IS THE FLOOD ELEVATION AFTER ENCROACHMENT
*SURCHARGE NOT TO EXCEED 1.0 FOOT (FIA REQUIREMENT) OR LESSER AMOUNT IF SPECIFIED BY STATE.

FLOODWAY SCHEMATIC

Figure 4

5.0 INSURANCE APPLICATION

In order to establish actuarial insurance rates, the FIA has developed a process to transform the data from the engineering study into flood insurance criteria. This process includes the determination of reaches, Flood Hazard Factors (FHFs), and flood insurance zone designations for each flooding source affecting the Borough of Englishtown.

5.1 Reach Determinations

Reaches are defined as lengths of watercourses having relatively the same flood hazard, based on the average weighted difference in water-surface elevations between the 10- and 100-year floods. This difference does not have a variation greater than that indicated in the following table for more than 20 percent of the reach.

Average Difference Between 10- and 100-Year Floods	Variation
Less than 2 feet	0.5 foot
2 to 7 feet	1.0 foot
7.1 to 12 feet	2.0 feet
More than 12 feet	3.0 feet

The locations of the reaches determined for the flooding sources of the Borough of Englishtown are shown on the Flood Profiles (Exhibit 1) and are summarized in the Flood Insurance Zone Data Table (Table 3).

5.2 Flood Hazard Factors

The FHF is the FIA device used to correlate flood information with insurance rate tables. Correlations between property damage from floods and their FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

The FHF for a reach is the average weighted difference between the 10- and 100-year flood water-surface elevations expressed to the nearest 0.5 foot, and shown as a three-digit code. For example, if the difference between water-surface elevations of the 10- and 100-year floods is 0.7 foot, the FHF is 005; if the difference is 1.4 feet, the FHF is 015; if the difference is 5.0 feet, the FHF is 050. When the difference between the 10- and 100-year water-surface elevations is greater than 10.0 feet, accuracy for the FHF is to the nearest foot.

FLOODING SOURCE	PANEL[1]	ELEVATION DIFFERENCE[2] BETWEEN 1.0% (100-YEAR) FLOOD AND			FHF	ZONE	BASE FLOOD ELEVATION[3] (NGVD)
		10% (10 YR.)	2% (50 YR.)	0.2% (500 YR.)			
McGellairds Brook							
Reach 1	01	-1.6	-0.5	+1.2	015	A3	Varies
Weamaconk Creek							
Reach 1	01	-1.2	-0.4	+0.9	010	A2	Varies
Tributary to Weamaconk Creek							
Reach 1	01	-1.2	-0.5	+0.9	010	A2	Varies
Reach 2	01	-0.2	-0.1	+0.1	005	A1	Varies

[1]Flood Insurance Rate Map Panel
[2]Weighted average
[3]Rounded to the nearest foot - see map

TABLE 3

FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BOROUGH OF ENGLISHTOWN, NJ
(MONMOUTH CO.)

FLOOD INSURANCE ZONE DATA

McGELLAIRDS BROOK, WEAMACONK CREEK AND TRIBUTARY TO WEAMACONK CREEK

5.3 Flood Insurance Zones

After the determination of reaches and their respective FHFs, the entire incorporated area of the Borough of Englishtown was divided into zones, each having a specific flood potential or hazard. Each zone was assigned one of the following flood insurance zone designations:

Zones A1, A2, A3:	Special Flood Hazard Areas inundated by the 100-year flood, determined by detailed methods; base flood elevations shown, and zones subdivided according to FHF.
Zone B:	Areas between the Special Flood Hazard Area and the limits of the 500-year flood, including areas of the 500-year flood plain that are protected from the 100-year flood by dike, levee, or other water control structure; also, areas subject to certain types of 100-year shallow flooding where depths are less than 1.0 foot; and areas subject to 100-year flooding from sources with drainage areas less than 1 square mile. Zone B is not subdivided.
Zone C:	Areas of minimal flooding.

Table 3, "Flood Insurance Zone Data," summarizes the flood elevation differences, FHFs, flood insurance zones, and base flood elevations for the flooding sources studied in detail in the Borough of Englishtown.

5.4 Flood Insurance Rate Map Description

The Flood Insurance Rate Map for the Borough of Englishtown is, for insurance purposes, the principal result of the Flood Insurance Study. This map (published separately) contains the official delineation of flood insurance zones and base flood elevation lines. Base flood elevation lines show the locations of the expected whole-foot water-surface elevations of the base (100-year) flood. This map is developed in accordance with the latest flood insurance map preparation guidelines published by the FIA.

6.0 OTHER STUDIES

A Flood Insurance Study for the surrounding community of the Township of Manalapan provided data on McGellairds Brook and Weamaconk Creek for this study (Reference 4). The results of this study and the study for Manalapan will match exactly.

In 1973, a study was made of the Matchaponix Brook system for the New Jersey Division of Water Resources, Department of Environmental Protection (Reference 6). Results of the study for McGellairds Brook and Weamaconk Creek were compared with the 100-year flood flows determined in this study and found to be identical. Some differences were noted in the two flood levels, but the differences were within 0.2 foot.

This study is authoritative for purposes of the Flood Insurance Program, and the data presented here either supersede or are compatible with previous determinations.

7.0 LOCATION OF DATA

Survey, hydrologic, hydraulic, and other pertinent data used in this study can be obtained by contacting the office of the Insurance and Mitigation Division of the Federal Emergency Management Agency, Regional Director, Region III Office, Curtis Building, Sixth and Walnut Streets, Philadelphia, Pennsylvania 19106.

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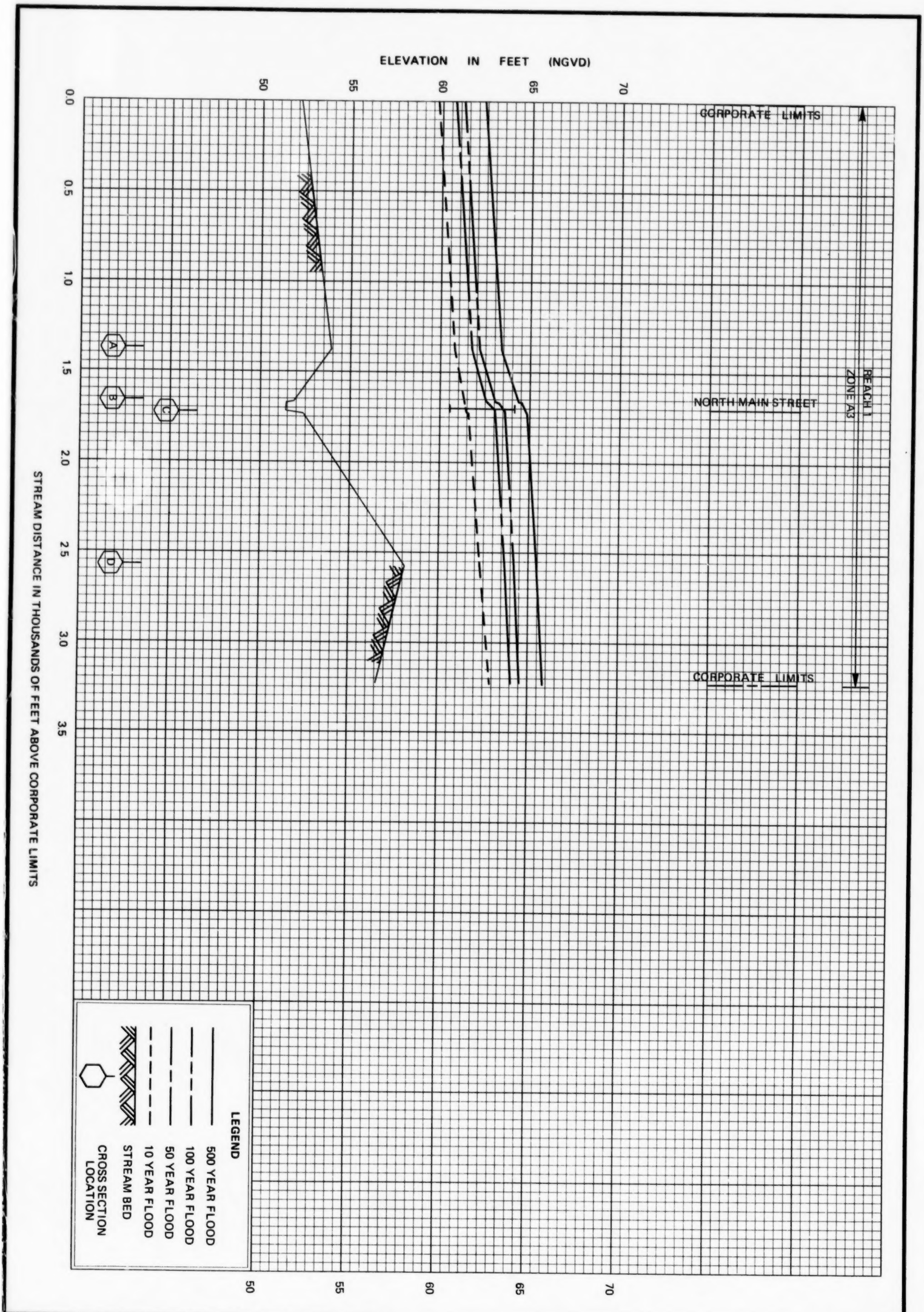

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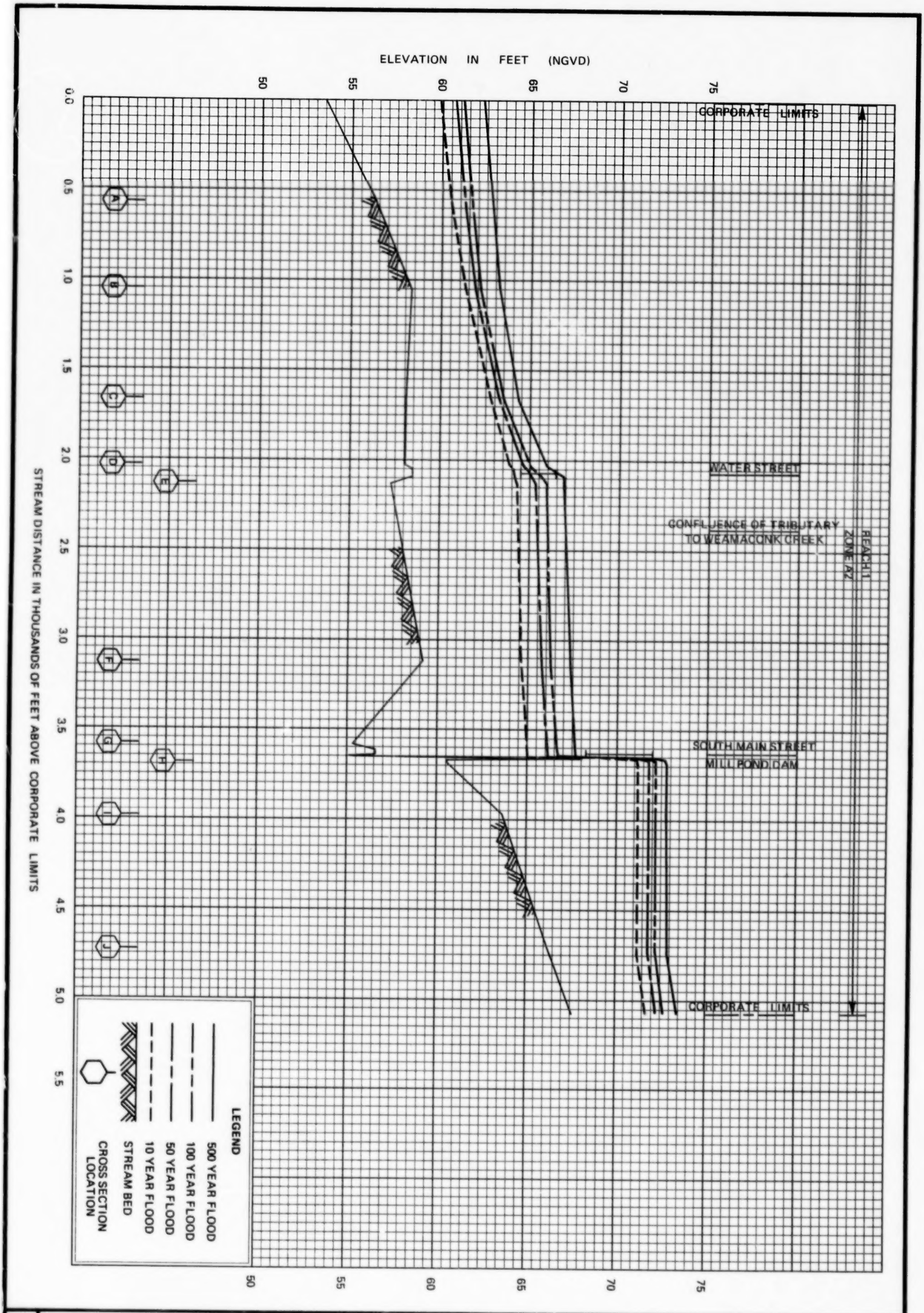
FEDERAL EMERGENCY MANAGEMENT AGENCY
Federal Insurance Administration

BOROUGH OF ENGLISHTOWN, NJ
(MONMOUTH CO.)

FLOOD PROFILES

McGELLAIRDS BROOK



FEDERAL EMERGENCY MANAGEMENT AGENCY
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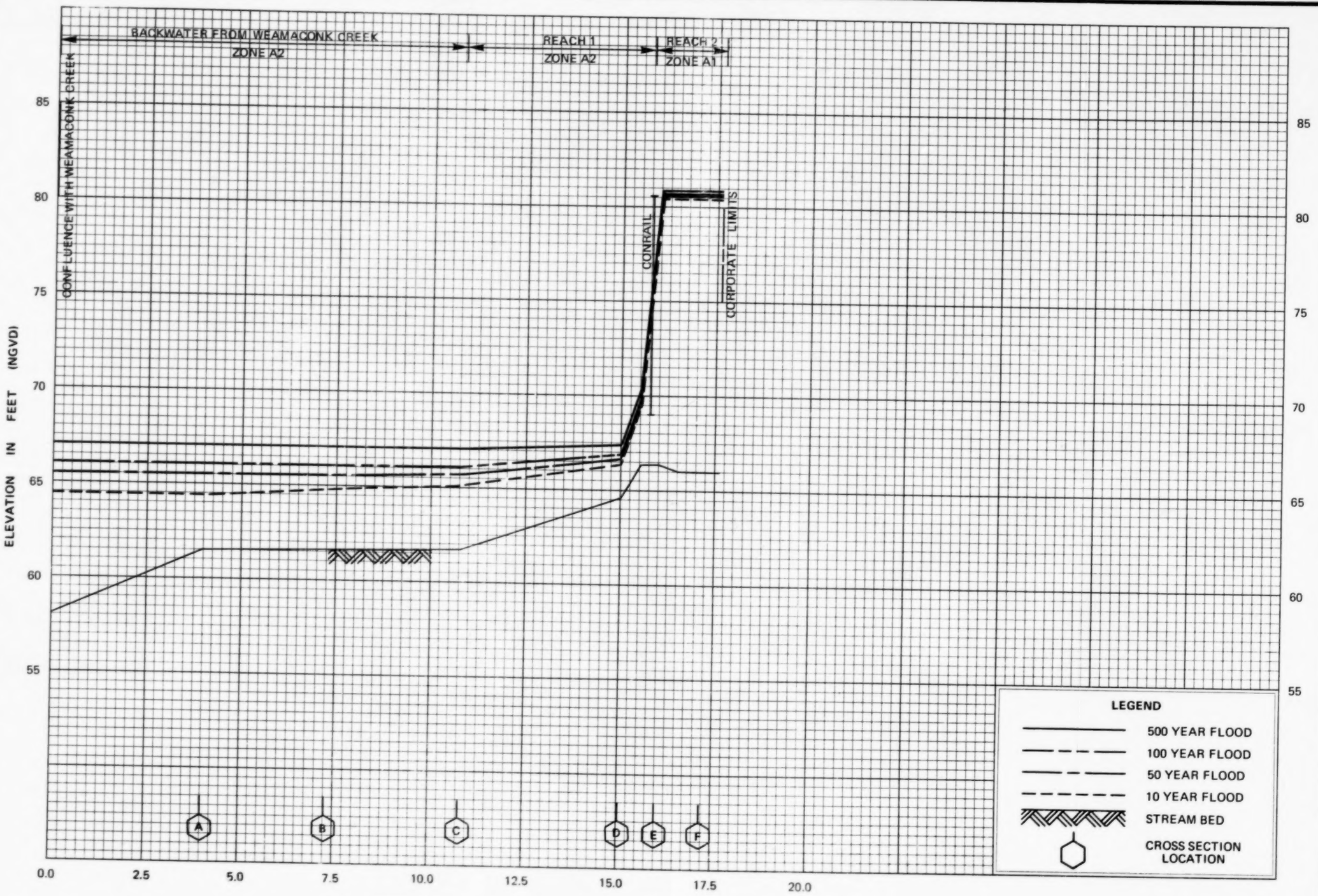
BOROUGH OF ENGLISHTOWN, NJ
(MONMOUTH CO.)

FLOOD PROFILES

WEAMACONK CREEK

02P



FLOOD PROFILES

TRIBUTARY TO WEAMACONK CREEK

FEDERAL EMERGENCY MANAGEMENT AGENCY
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03P